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Manuscript Notes from my Journal.

COTTON,

AND

THE PRINCIPAL INSECTS, &c., FREQUENTING OR INJURING
THE PLANT,

IN THE

UNITED STATES.

BY

TOWNEND GLOVER

WASHINGTON, D. C.

Written and etched by Townend Glover. Transferred to and Printed from Stone by J. C. Enticole.

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Cotton.

1.

And the principal Insects frequenting the plant in the
United States.

The insects injurious or beneficial to the Cotton plant, figured in the following work, were all drawn and colored from living specimens, taken in the cotton plantations of Alabama, Florida, Georgia, South Carolina, &c. — The habits of these insects, their natural history — and the best remedies suggested, or used, to destroy them or to guard against their injuries, may be found in the Annual Reports of the Department of Agriculture, principally, for the years 1854, page 56, - 75, and Report 1855, p. 64 - 115. Great care however must be taken when quoting the scientific, or common English names, of the insects mentioned in the text of these reports, as most of them were manufactured for the occasion, (against the urgent remonstrances of the Entomologist) by a former chief clerk (Mr D. J. Browne) who although he knew nothing about Entomology, claimed the right (by virtue of his official position and as proof reader,) of using what names he chose to make, & to alter the text to suit his own views. The names used on the plates themselves, having been subsequently prepared, are more reliable. It will also be well to mention here that all the articles accompanying the Report of 1858, p. 121, excepting the main facts, (of the woodcuts) was also written by Mr D. J. Browne, against my remonstrances and published under my name, and it is to his fertile brain and prolific pen alone that I owe all the blunders and imitations, therein so vividly depicted.

The insects injuring Orange trees, will be found described in Ag. Rept. 1855, p. 115. 1858, p. 261 - 256, — 1859, p. 500 - 551 - 554. 1854, 561. & 1865, p. 91. The figures of the insects however are generally scattered throughout my larger general work of "Illustrations of Insects"

As it may be of interest to Cotton planters, to be able to refer to some of the principal articles relating to Cotton, already published in the Agricultural Reports, of the Department, we will give a list of such as are of the most interest, prepared for this work by Mr Horace Piper of the department, who has for some years been engaged in preparing a complete list of all the articles in the Agricultural Reports, for general use.

Ag. Rept. 1849, p. 318. Remarks on the cultivation of Cotton.

" " 1852, p. 439. The cotton trade.

" " 1853, p. 195. Remarks on the cotton of India.

" " 1853, p. 363. Cotton in the climate of the United States: see also article 1853 p. 371.

" " 1854, p. 177. History & Culture of Cotton in Mississippi. J. W. W. Report.

" " 1854, p. 181. Investigation of the cotton fibre. Dr Schaeffer.

" " 1854, p. 59. Insects infesting the cotton plant. J. Glover.

" " 1855, p. 64. Insects frequenting the cotton plant. J. Glover.

" " 1855, p. 226. History and results, of the culture of cotton in British India. Dr Brown.

" " 1855, p. 230. Accidents & diseases of the Cotton plant. (Rot &c.) J. Glover.

" " 1855, p. 235. Chemical researches on the seed of the cotton plant. Dr Jackson.

" " 1855, p. 372. The cotton districts of the globe, considered with reference to

{ their climates, &c. (from authentic sources.)

" " 1856, p. 265. Production, Commerce, and Manufactures, of Cotton in the various countries of the globe. (Circular from the Department & replies)

" " 1857, p. 121. Investigations, on Insects, & diseases, affecting the Cotton plant. { Blight &c. J. Glover.

" " 1857, p. 305. Cotton manufactures, of the United States. Dr Brown.

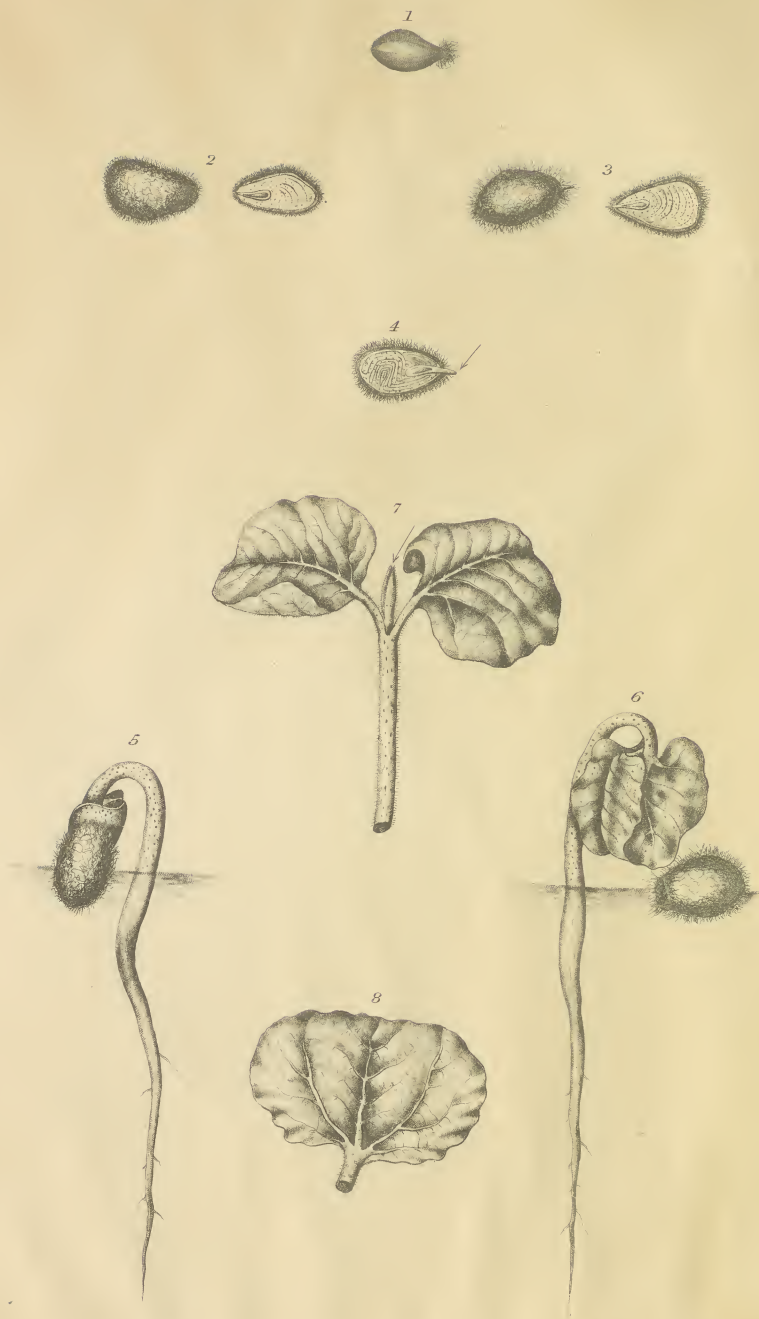
J. Glover.



- Ag^t Report 1857. page 322 . . . { Report on the consumption of cotton in the various countries
of the world. Claiborne.
- " " 1858. p. 271. . . { Insects injurious to the cotton plant in Florida. (only one
mentioned is *Dysdercus suturellus*. The red bug. J. Glover.
- " " 1861. p. 221. Cotton in Missouri. Horner.
- " " 1862. p. 104. Cotton.
- " " 1868. p. 88. Production of Cotton by free labor. M. D. Landon.
- " " 1866. p. 190. Cotton culture in 1866. W. B. Cloud.
- " " 1866. p. 193. Cotton planting. J. B. Lyman.
- " " 1867. p. 409. Cotton under high culture. G. W. Giff.
- " " 1872. p. 406. { Chronological & statistical history of Cotton. E. J. Donnell
merely a review of work.

J. Glover.



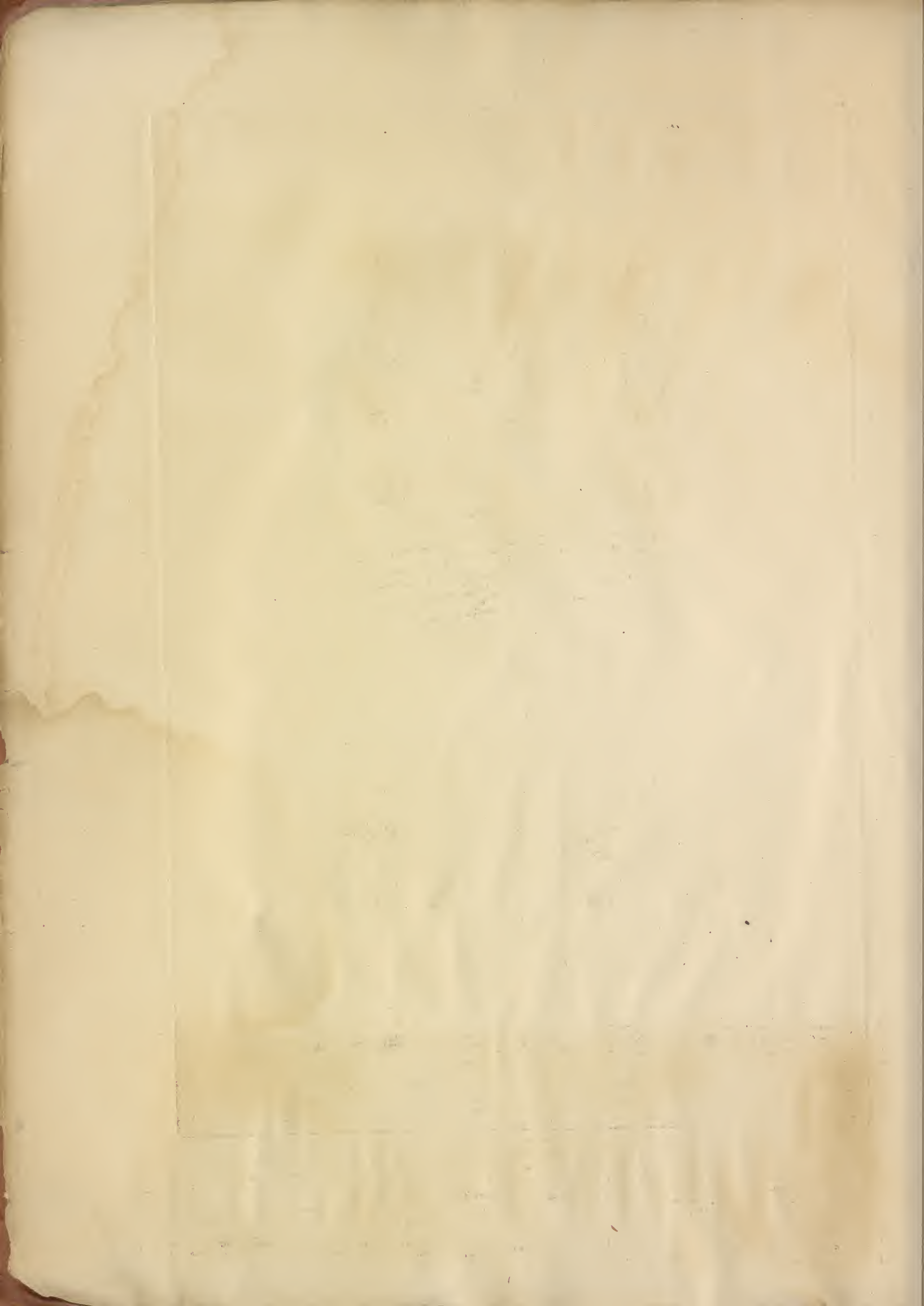


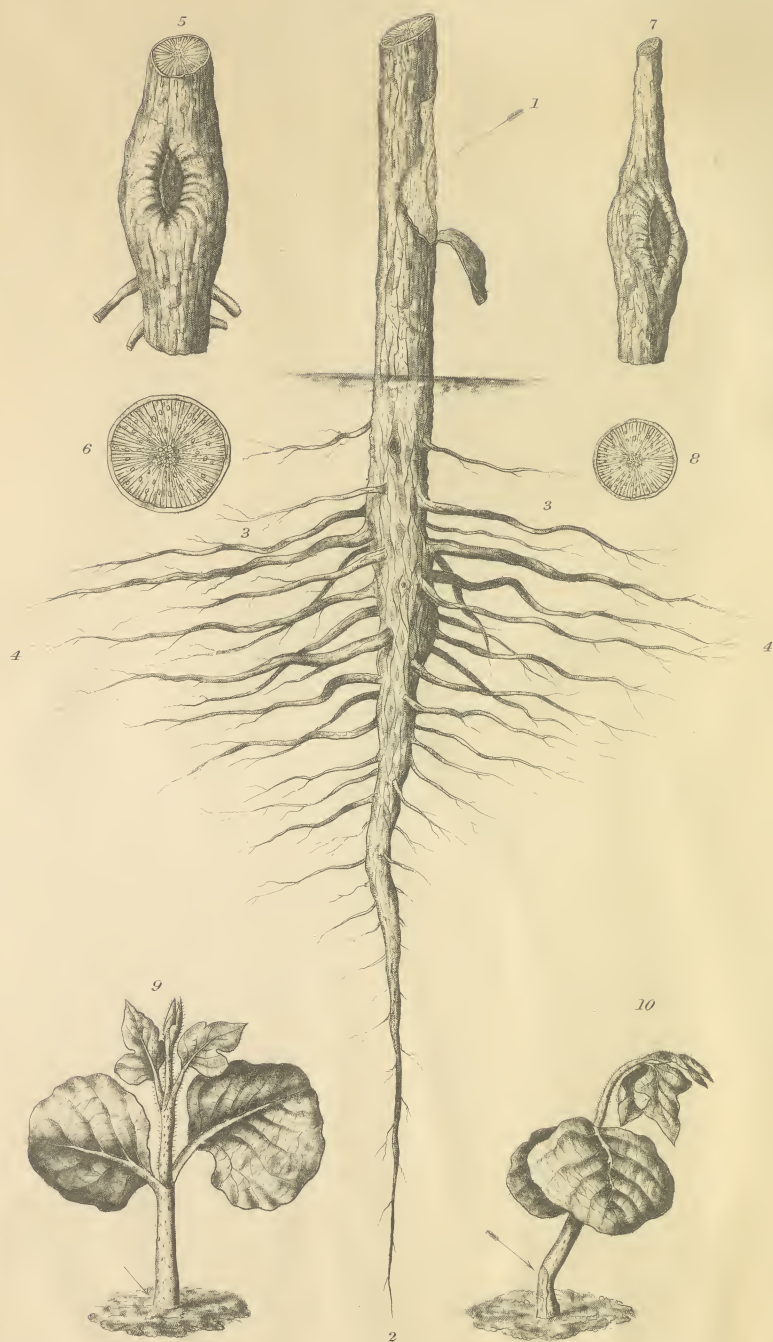
Cotton Seeds & young plants.

Plate 1.

1. Seed of the Sea Island, long staple, or black seed Cotton. — 2. green seed variety, perfect & cut open longitudinally, to exhibit the enclosed cotyledons (or seed leaves) & embryo plant. — 3. Gray seed variety. — 4. A seed cut open to exhibit cotyledons as folded up in the outer case, with the radicle or root protruding & ready to enter the earth. — 5. Cotyledons or lobes of the seed, as developing themselves from the outer case or covering, with the radicle or root penetrating the soil. — 6. Cotyledons, as perfectly free from the outer covering & as yet uncolored, by exposure to air & light. — 7. Cotyledons colored, with the two first true leaves (of future plant) appearing between them. — 8. Single cotyledon with venation.

Note. When cotton seed is sown or placed upon damp earth, it first swells by imbibing moisture. The radicle or future root breaks out of the "hilum" or scar. (See fig 4) and penetrates into the soil. The cotyledons or lobes of the seed supplying the young plant with nourishment are fully developed from out of the outer case of the seed. (See fig 6.) and finally between these arise the first two true leaves (see fig 7) which are of a shape differing from the older leaves not being so fully developed, as to shape, size, & color. Young plants at this period of their growth are subject to the rot of footstalk (improperly called "sowles") (pl 2 fig 10) to the attacks of Cotton lice (see plate 6 fig 3) & of the different species of Cut worms, *Agrotidae*.





Cotton Root and disease commonly known as Sore shin. Plate 2.

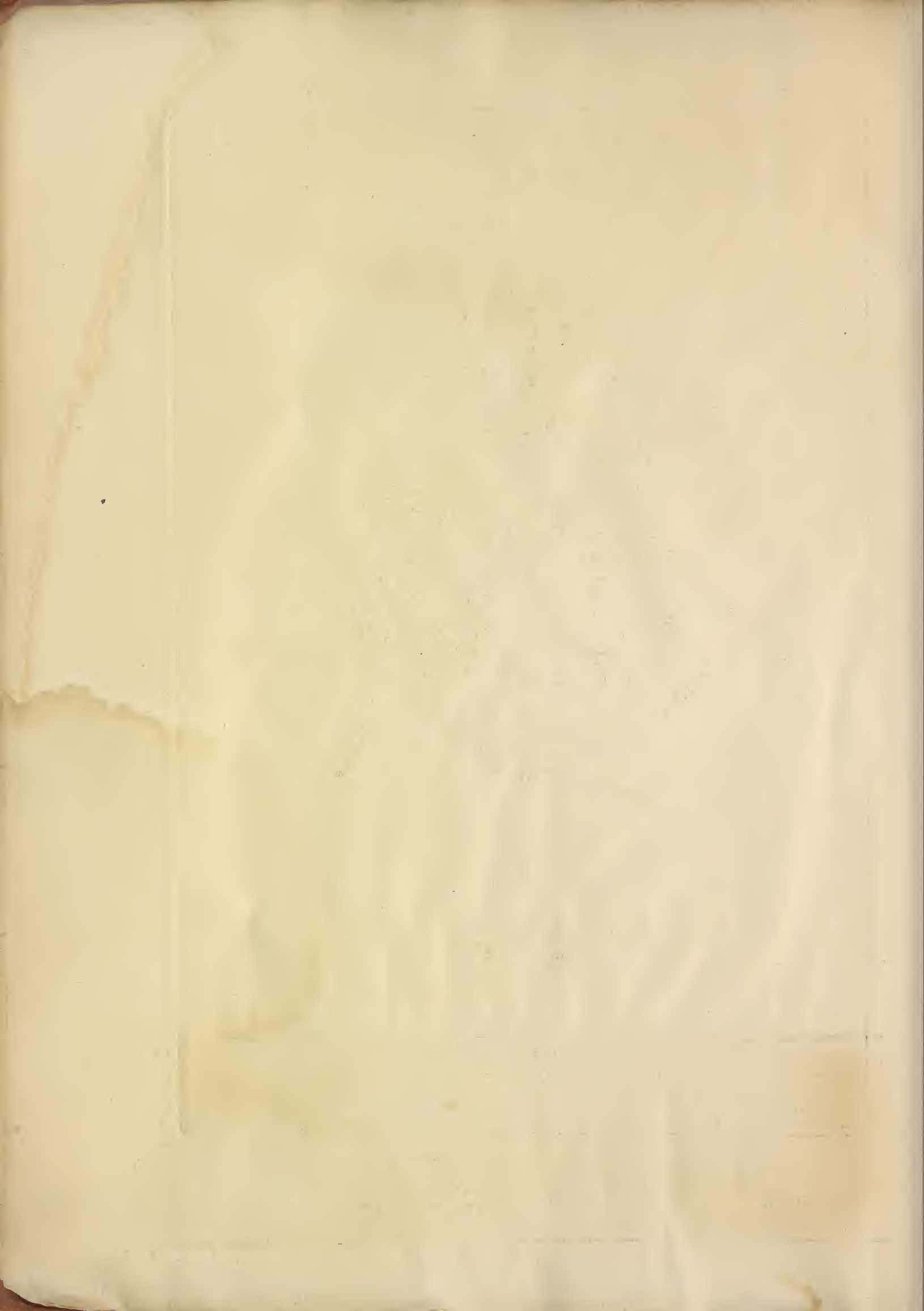
1 Bark or skin scraped off when hoeing the young plant carelessly. 2 The tap root.

3 The lateral roots. 4 Spongioles, or feeding roots of the plant.

5 Old injury as at Fig 1. when healed up, on the root, below the earth. 6 Transverse section of the root. 7 Old injury to the stem as at Fig 1. healed up. The upper part of the stem as in the figure frequently becomes much attenuated, & incapable of sustaining the weight of the foliage & breaks off during high winds, the injury is not so great when the bark is scraped off above the first pair of leaves, as then the plant can throw out new and healthy shoots. 8 Transverse section of stem, showing the bark, woody fibre, pith & medullary rays. 9 Healthy young cotton plant.

Another kind of sore shin is frequently caused by strong winds, so bending & bruising the plant, near the ground where marked in the figure, when the plant is somewhat older that the bark is injured, and the same results may be expected as at Fig 8 & 10. 10 Young plant attacked by rot at or near the surface of the ground. This is frequently caused by improper drainage or cold wet weather. The plant thus attacked first droops, & eventually dies. This rot of foot stalk is also frequently called sore shin. For analysis of plant & seed, see Proc Acad. vol 6. p 195.

W. S. Mearns.

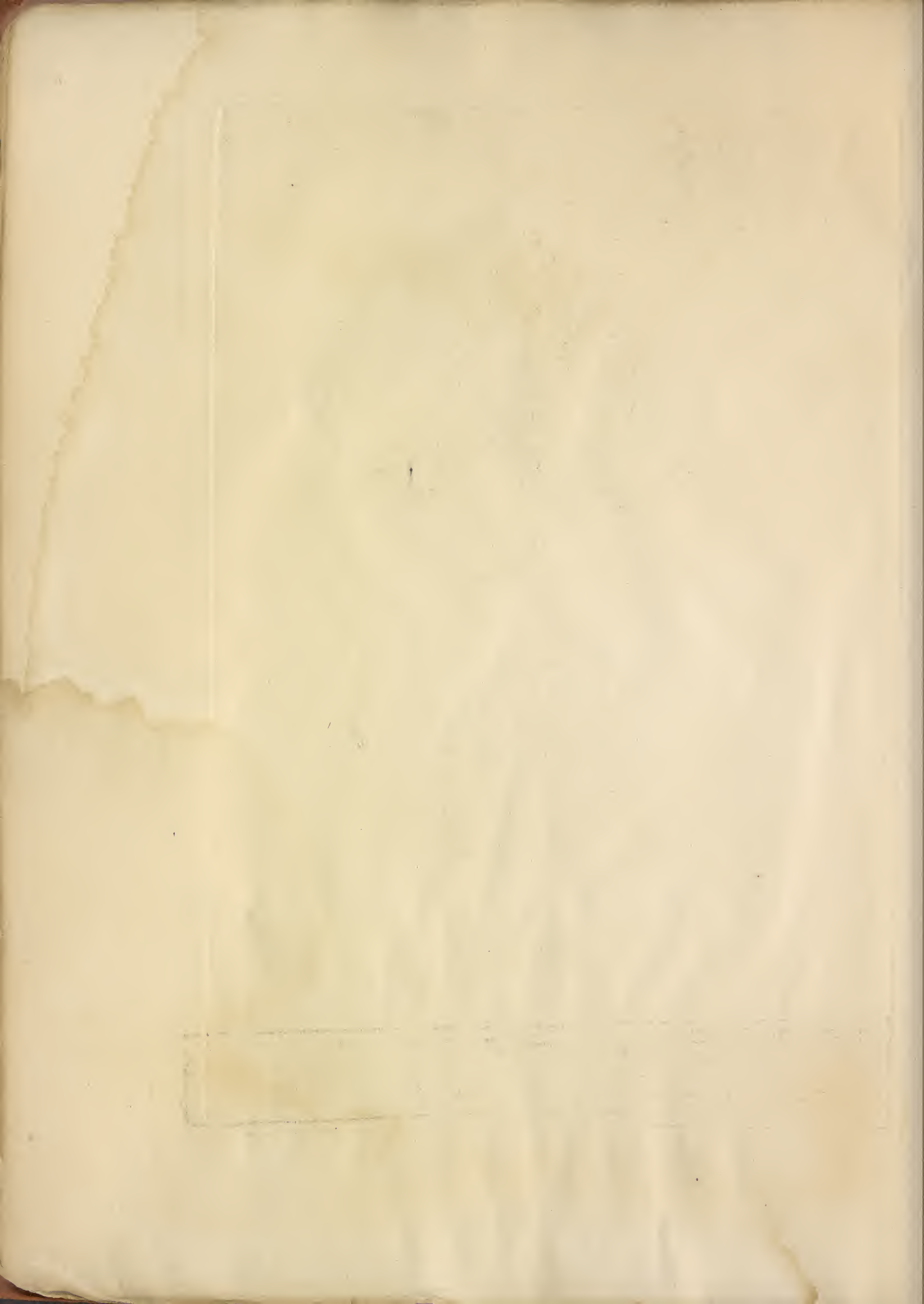




Cotton . disease on Leaf . Rust. Plate 3. Fungoid Disease

1. Leaf as beginning to rust — 2. Leaf as rusted. — 3. very bad case of rust. Leaf as ready to fall. last stage of disease. — 4. Leaf as presenting the appearance of Rust. but which on examination with a magnifying glass will be found to be caused by the attacks of a minute Arachnid. commonly known as the red spider. in this case the back of the leaf is generally covered with a web — 5. the Acarus or red spider green. and apparently young. — 6. Side view of red spider magnified. — 7. dorsal view. — This red spider attacks the leaf of the cotton plant in a manner similar to the acarus of Europe. sulphur has been recommended as a remedy when dusted in a dry powdered state on the plants, when moist, or applied when the flour of Sulphur is mixed with a very small quantity of "unsalted" or "slacking" lime in powder & then gradually mingled with water.

Blow



IV



1



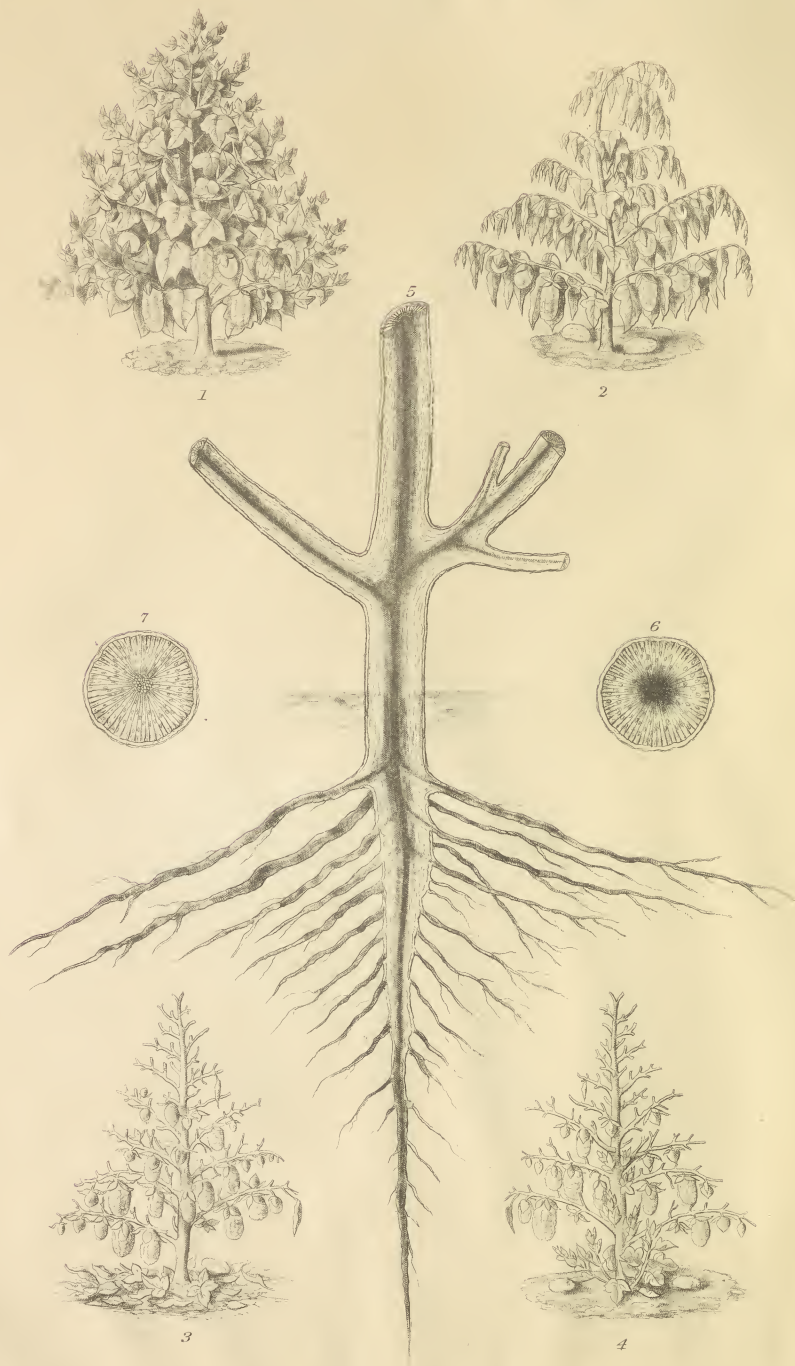
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Cotton Plant rusted.

Plate 4. Fungoid Disease.

1. Plant showing evident symptoms of rust, in its foliage, the color of the leaves being yellow blotched with red, instead of being of a healthy green. (For leaf rust see pl. 3. boll rust 21)
2. The same plant as dead, with rust the stalk being brown, dried up, & brittle, & with no second growth appearing, as in the disease called Wight (fig 4 page 5.) J. Glover.



Cotton Disease.Blight.Plate 5.

1. Cotton plant. (Short Staple or upland) (*Gossypium herbaceum*.) Perfectly vigorous and healthy plant, as to outward appearance. — 2. The same plant a few days afterwards, exhibiting the first symptoms of Blight. the leaves & blossoms drooping and withering. — 3. Same plant 10. or 12 days afterwards. the large bolls still advancing & ripening. & the foliage fallen to the ground. — 4. Same plant exhibiting a second growth, which sometimes occurs during favorable seasons. — 5. Stalk & root cut longitudinally, in order to show the centre diseased & blackened. This disease does not always extend so far into the stalk as in the figure, or is of as dark a color. — 6. Transverse section of a blighted stalk showing centre part blackened and diseased. — 7. Transverse section of healthy Stalk.

J. Glover





Cotton Insects. Louse.

Plate 6

1. Young leaf of upland cotton curled by the punctures, & subsequent drainage of sap, of Cotton lice, (*Aphis gossypii*.) which are mostly to be found on the underside of the leaf.—2. Young plant attacked by Cotton lice.—3. Distortion of the stem caused by punctures of Cotton lice.—4. Young shoot of a cotton plant covered with cotton lice (nat size).—5. Winged cotton lice. mag.².—6. Louse shedding, or "casting" its skin. - mag.².—7. Wingless cotton lice. mag.².—8. Anal tubercles from which the sweet viscid substance commonly known by the name of Honey dew is discharged upon the leaves beneath. The dust & dirt adhering to this so called honey dew disfigures the plant, stops its growth, & cause it to appear black & dirty.—9. 10. 11. Antennae head & legs of *Aphis* magnified.
- Note: Ants and various other insects are attracted to the plants by the honey dew which they eagerly devour, even from the anal tubercles of the louse itself which discharges a drop on being slightly tapped by the antennae of the Ant.

J. G. Linn.





Cotton Leaf & insects, injuring it. Plate 7.

1. Caterpillar found eating the flowers in Georgia last of October not very numerous.
 2. Cocoon of loose web of silk amongst the leaves &c. — 3 Chrysalis. — 4 perfect moth.
Plusia? specimen somewhat dwarfed. — 5 Moth at rest. — 6 Young span or measuring
 worm found early in October in Georgia feeding on the flowers of the cotton plants: growth.
 6a the same caterpillar full grown. — 7 Chrysalis in the ground — 8 perfect moth. *Boarmia*
 (Geomet). — 9. Caterpillar found in Georgia feeding on flowers of Cotton in October — 10.
 cocoon amongst leaves. & chrysalis — 11. Moth. *Plusia*? flying and at rest.
 Note The moths no 4. & 11. are very similar in shape, color, markings, & habits, but the
 longitudinally striped green caterpillar, at fig 9. invariably produced dark colored chry-
 salides, whilst the green caterpillar at Fig 1. produced green chrysalides, as at fig 10. (79.)



VIII

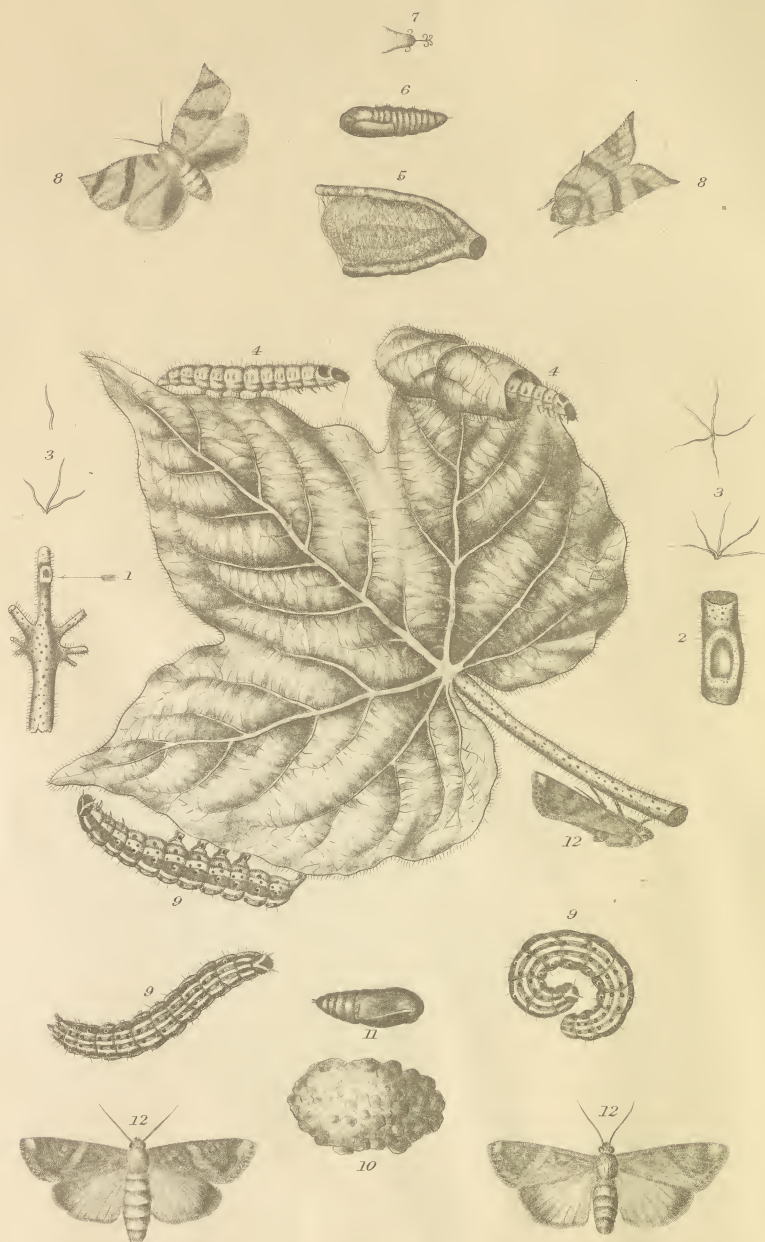


Cotton, leaf & insects injuring it.

Plate 8.

1. Caterpillar 2. Cocoon 3. Chrysalis and perfect moths of *Hyperchiria varia* ♂ 1 1/2
 " not very numerous, but completely strips a *Saturnia* 10 " ♀ 1 1/2
 plant of foliage. Corn Emperor of Smith & Abbott.
 J. G. S. 1850





Cotton. Upland leaf. (Three lobed) & insects injuring it. **Plate 9**

The plant produces three lobed leaves when young, & 5 lobed leaves when old.

1. Gland on midrib at the back of the leaf. This is frequently filled with a sweet substance, which proves very attractive to ants & other insects. — 2 Same gland magnified. — 3 Hairs on the back of leaf magnified. — 4 *Loroxaenica*, (*Tortrix*) *rosaceana*, var. *Gossypii* Caterpillar found in the rolled up leaves of cotton. — 5 Cocoon formed of loosely spun silk amongst or in the leaves. — 6 Chrysalis. — 7 Hooks on the tail of Chrysalis by which it is fastened to the loose silk of the cocoon. — 8. Moth flying & at rest. — 9 Grass Army worm, Caterpillar, side & dorsal view & as curled up when disturbed. — 10 Cocoons formed of particles of soil cemented together with silk or gum, found under stones or just under the surface of the earth. — 11 Chrysalis in earthen cocoon under ground. — 12 Moth at rest with the lightest & darkest colored specimens. This insect resembles *Lophrygma fugiperda* of Smith & Abbott, or *L. macra* of the British Museum. It must not be confounded with the true army worm of the cotton (see pl. 10) *Aletia argyllacea*. (*Anomis xylinæ* Say. *A. bipunctata* Guenee) the grass worm eats the weeds between the rows, & seldom injures cotton, whilst the cotton worm, eats nothing but the cotton. *396*





Cotton. Insects injurious to the foliage. U.S. Plate 10. "Cotton Army worm."
Alattia argyralacea (Hüb.) Syn. *Anomis* *Evulvae* (Say.) "Cotton Caterpillar" "fly" or "moth".

1. Egg as deposited on a leaf. in August. Florida. — 2. Egg, nat size & mag. — 3. young caterpillar before shedding its skin nat size. — 4. do after first moult. — 5. after second moult. — 6. do after third moult. — 7. Full grown caterpillar early in the season & when the first crop of worms are mostly green. — 8. 9. Full grown caterpillars of the last crop of worms. in Sep. & Oct. when they are mostly very dark colored. — 10. Cotton (upland) leaf, (5 lobed) as eaten by caterpillars. — 11. Second pair of ventral feet of caterpillar perfectly formed. — 12. First pair of ventral feet imperfectly formed, to show why the caterpillar loops its body when progressing, as the feet cannot be used for clasp- ing. This peculiarity, marks it distinctly from the other so called "Army worm" or "Grass caterpillar". — 13. Leaf webbed together, to form cocoon. — 14. Cocoon opened to show the green caterpillar about to change into a chrysalis. — 15. Young chrysalis with the skin of the caterpillar yet adhering to the tail. — 16. Old chrysalis full color. — 17. Hooks at the end of tail of chrysalis. (magnified) to show why it adheres so firmly to the loose web. — 18. 19. 20. Moth flying. & at rest, upper & under side. — 21. Head of moth mag. J. G. Rehn



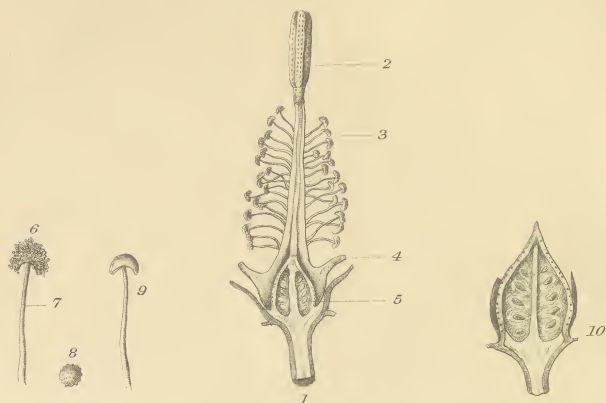


Cotton. Terminal shoot, with Insects infesting or destroying it. Plate 11.
 1. Bud injured. — 2. *Loxotaenia* (*Sortrix*) *gossypiaria*. (Pack. 355) Caterpillar makes itself up in the terminal shoots, or leaves, where it changes into a chrysalis. The moth appears in a few days in summer, or early autumn. — 3. *Anthrenus*. *insidiosus*. (Heteropterous insect) supposed to be beneficial, by destroying small insects. — 4. *Centrinus* (Sch.) *pericillus* (Sch.) a Coleopterous insect (or Beetle), supposed to pierce young buds, &c. & sometimes very abundant, on the terminal shoots, and flowers. — 5. *Calocoris*. *rapides*. (Hb.) injures the plants by sucking out the sap, piercing leaves, and young shoots. — 6. *Calocoris* *limaculatus*. (Sch.) (Hb.) plant bug. habits same as figure 5.
 J. C. G. 1847.





Cotton Flower open first day (of a light yellow color) with insects injuring it Plate 13.
 1 Flower (or Bloom) first day. Light yellow, changing second day to pink, see p. 15.
 2. *Epicauta* (Redt.) *Cantharis* (Sinn.) *strigosa*, Sch. Insect eats holes in flowers. &c.
 3. " " " " *vittata*, Fab. " " " " " "
 4. " " " " *ferruginea*, Say. " " " " " "
 5. *Chaulio gnathus* (Hentz.) *americanus*, Foster. *pennsylvanicus*, de Geer, frequently, but does not appear to injure the flowers.
 6. *Chaulio gnathus* " *marginatus*, Fab. frequently but does not appear to injure the flowers.
 J. Glover



Cotton. Young forms shed in consequence of wet weather. Plate 14.
 1. Young flower, with corolla, & "ruffle" cut off to exhibit pistil & stamens. 2. pistil, or female part of flower. 3. Stamens, or male parts of flower. 4. Corolla where cut off.
 5. young unimpregnated seed vessel, or unimpregnated boll. 6. male parts of fructification, consisting of the anther, covered with grains of pollen, appearing to the naked eye like yellow powder. 7. Filament of stamen. 8. magnified grain of pollen, or impregnating dust.
 9. Stamen as when the pollen has been washed off by rain, in the morning, before impregnation has taken place. 10. Young boll cut open, to show the nonimpregnated seeds, turning brown.
 11. Young square as when, fallen to the ground, or shed, in consequence of nonimpregnation.
 Note. When heavy rains occur, in the morning, from 8 to 2 o'clock, the pollen is frequently washed away from the anther, as in fig 9. & none of the impregnating dust being conveyed to the pistil, fig 2, of course the seed is not fecundated, & the young squares perish. Several insects serve as important agents by which the impregnation of many plants is effected, as by their instrumentality the pollen is carried, adhering to their legs or bodies, to places much too far distant to be reached by ordinary means. Wind also serves as an agent in the distribution of pollen, hence the crossing of cotton. Corn &c. &c.



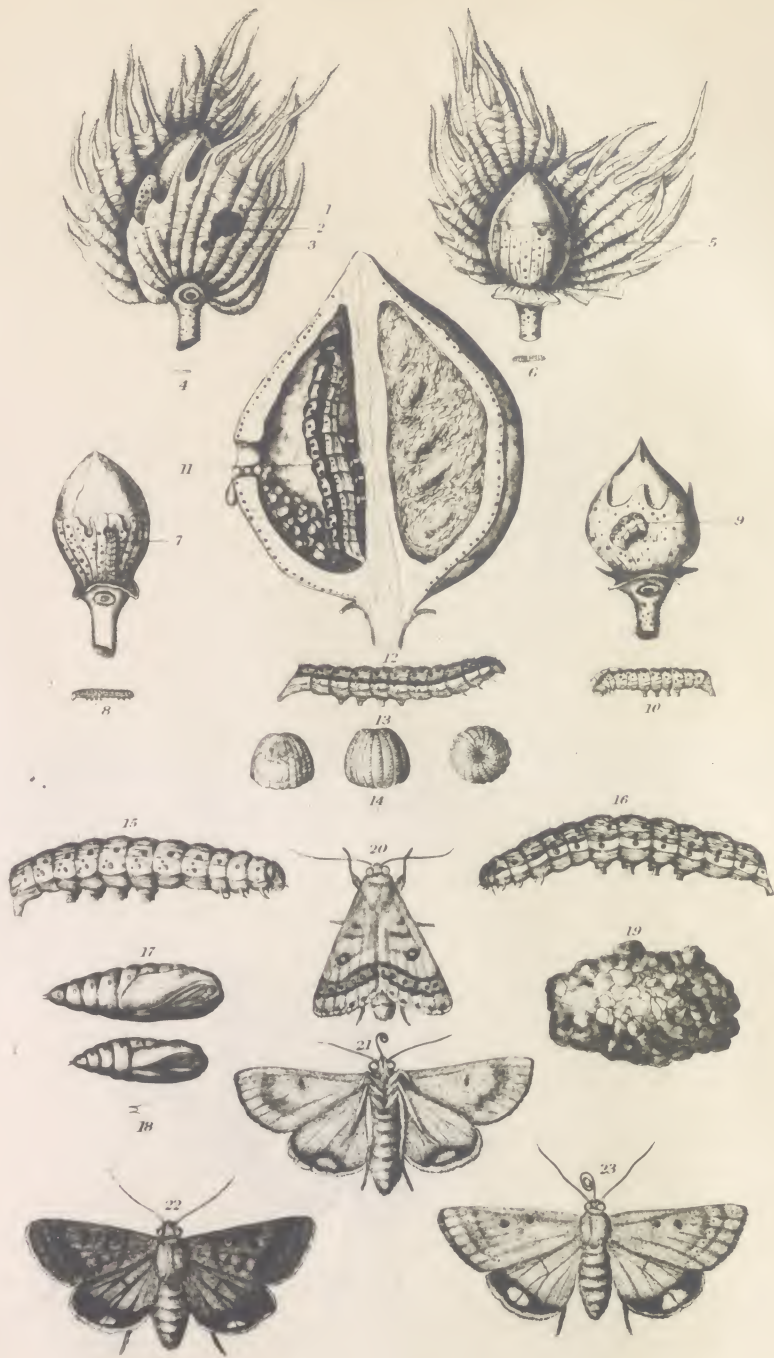
Cotton, Young Bolls, & insects frequenting them. Plate 16.
 1. Young healthy cotton boll. — 2. young boll cut open longitudinally to show position of seeds. &c.
 3. Boll cut open transversely, — 4. gland at base of "ruffle" containing a sweet viscid substance, very attractive to ants, & small insects — 5. young boll with "ruffle" cut off.
 6. *L. phyllopus* (Sinn. Het.) *Anisoscus albidus* Say. found once on a boll punctured by some insect, apparently sucking the sap, & also said to kill other insects.
 7. *L. punctipes* (Vall.) *Euschistus* Say. said to suck the sap, as also to kill other insects.
 8. *Nezara* (Amy) (*Raphigaster*) *pennsylvanicus* De Geer, same habits as above, fig 7.
 9. *L. longus* (Hahn) *succinctus* (Sinn) found on boll, said to destroy other insects, & stings severely. Not common on plant, but generally found on the ground & under stones. J. Glover





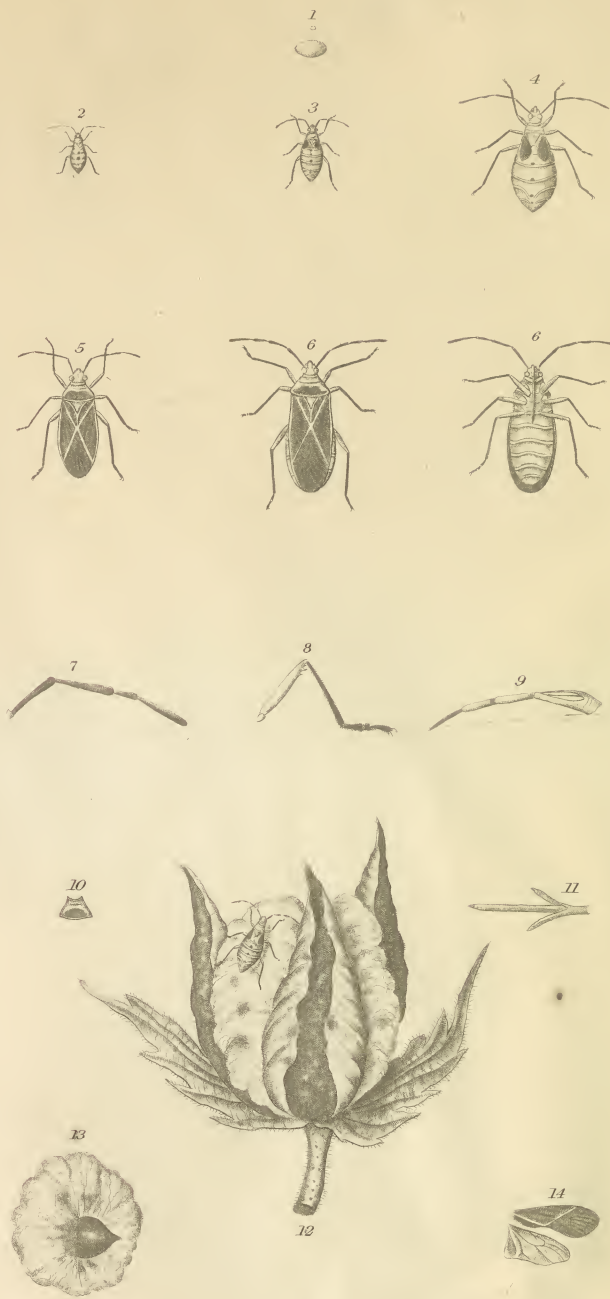
Cotton. Flower. "square" & Boll worm. Plate 17. moth. *Heliothis (Ochs) armigera (Hus.)*
 1 Egg as deposited upon the outside of the involucre or ruffle. — 2 Holes eaten through the involucre & corolla by the young boll worm, before the flower bud has matured into the perfect flower. — 3 young boll worm eating stamens &c. & causing its destruction. — 4. Frass dropped by young worm. — 5. Hole eaten through the bottom of flower into the empty seed vessel or boll. — 6 young worm eating interior of young boll. — 7 Pistil distorted, and stamens destroyed by attack of young worm. & frequently the cause of nonimpregnation. — 8 Young flower bud & stalk attacked by the young worm, with the interior eaten out. — 9. same as fallen, the involucre always in planters phrase "flaring open." — 10 Full grown boll worm boring into full grown boll - hence another common name "Bore worm." — 11 Eggs of moth *Heliothis (Ochs) armigera (Hus.)* *H. umbrascus (Grote) mag.* — 12 Caterpillar or worm, darkest brown color, with yellow longitudinal stripes on side. — 13. Cocoon formed of particles of earth woven or gummed together, under ground. — 14. End of tail of chrysalis. — 15. Moth or perfect insect, at rest (largest specimens seen). — 16. Moth flying. The colors & markings of these moths vary very much, some being light greenish drab, whilst others are dark brownish & yellow. The same insect is very common in Maryland where it destroys growing ears of Maize or Corn. *Yellow*





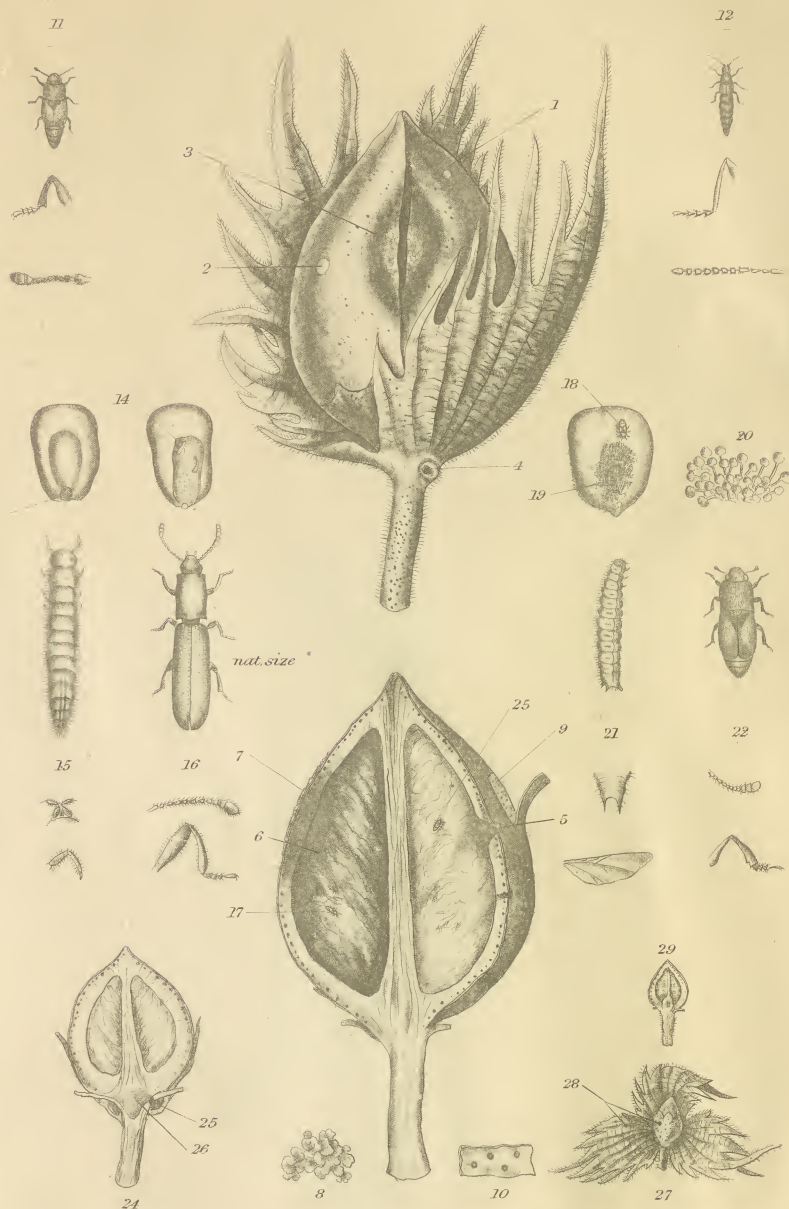
Cotton. Boll or Bore worm. St. Geo. Fla. Corn Worm. Va. Md. Pa. Plate 18.
Heliothis (Onts) armigera (Huf.) Hübner. Gr. le. — 1. Egg not seen as deposited about twilight, upon the involucre (or ruff) — 2. *Prothyma*, or cellular tissue of the leaf as eaten by the caterpillar the third day from the hatching of the egg. — 3. Hole eaten through the involucre, the 5th day. — 4. series of worm before shedding its skin. — 5. Young worm, eating the calyx the 6th day. — 6. series of worm after first moult. — 7. young worm eating the flower bud, the 9th day. — 8. series of worm after second moult. — 9. young worm eating into the young boll the 14th day. — 10. series of worm when moulting the third time, showing the worm in the act of shedding its skin. — 11. Full grown boll worm, with hole eaten in side of boll after shedding skin the fourth time. (19th day) with pass in the boll. — 12. Boll cut open longitudinal, to exhibit injury. — 13. worm not seen after shedding skin the 6th time. — 14. Eggs magnified, with young worm inside. — 15. Green specimen of caterpillar. — 16. Brown specimen of caterpillar. — 17. These caterpillars vary much in color, even when from the same mother & on the same plant. — 18. Large & small chrysalis. — 19. Cocoon formed under ground. — 20. Moth at rest, ordinary color. — 21. Moth at rest, greenish color. — 22. Dark colored specimen of moth. — 23. Light colored specimen of moth.
Note. These notes were made from insects raised from eggs in Florida, in Sept. The time for the moths to appear, varies however according to the temperature & season. T. G. W.





Cotton. Insects injuring it. Cotton Stainer, or Red bug. Plate 19.

1. *Dysdercus* (Amy 272) *suturellus*. H. Sch. (*Pyrahoconis*. Burm.) Red bug, egg nat. size, & magnified.
 2. " young insect before acquiring wings. — 3. same with rudimentary wings.
 4. Insect immediately before acquiring wings. — 5. Insect ♂ nat. size — 6. Insect ♀ dorsal & ventral view to show position of piercer or sucker — 7. antennae mag. — 8. leg magnified.
 9. Piercer which the insect inserts into the boll or seed, to suck sap, or juice — 10. Thorax, nat. size — 11. interior part of piercer. — 12. Cotton boll dwarfed & staple stained by the red bugs. — 13. single seed of Sea island Cotton, with staple half stripped off, to show seed & the cotton as stained by the insects. — 14. Upper & under wings of insect, nat. size.
 (Note.) None of these insects were found in or near Tallahassee, Florida, in 1855, but immense numbers of them were seen infesting the fields, near Jacksonville (Fla.) where the cotton plants were literally colored red with the multitudes that were crawling over the stalks, leaves, & bolls. It is also worthy of remark, that none of these red bugs, were seen by me in former years in S. Car. Geo. Alab. Missis. or Tennessee, up to the present time 1857.



Cotton. Bolls. Rot & insects infesting Rotted bolls, Plate 27.

1. The rot first commencing with the appearance of a small greasy looking spot, on the outside of the boll
2. Rot increasing & spreading internally (see also fig 5) — 3. Bad case of rot with the sides of cells or divisions dried up, & burst open, in the centre of the brown, rotted spot is a reddish fungoid growth (magnified at fig 8.) — 4. One of the three glands on the outside of the involucre secreting a sweet viscid substance, much sought after by flies, ants &c. this gland is sometimes pierced by insects causing a different kind of rot. (see fig 24) — 5. The rot as at fig 2, increasing, & spreading internally.
6. Rotted boll cut open to show the rot spread through one entire cell or division & the cotton destroyed
7. The fungoid growth as at fig 3, on the outside of boll — 8. The same fungus magnified. — 9. The skin of the boll raised, to exhibit the pores filled with a strong resinous smelling substance. — 10. Pores mag^d.
- Insects found in Rotted Bolls, but in no manner the cause of the rot disease. —
11. *Clastus semitectus*. Er (Col) This insect was found abundantly in rotted bolls where it feeds on fungi
12. *Homalota* ? { at rotted matter }
13. Corn (Maize) { as attacked by *Silvanus quadricollis* (Col) The egg appeared to have been deposited at the point designated by the line. — 14. Same grain opened, to show ravages of insect
15. Larva of *Silvanus quadricollis* mag^d — 16. Ins. mag^d — 17. Ins in rotted boll of cotton — 18. Same on Corn. —
19. Fungoid growth on Corn. — 20. Same mag^d — 21. Larva of *Carpophilus hemipterus* (Col) — 22. Insect mag^d.
23. Insect in rotted boll — 24. Insect in boll caused by puncture of an insect — 25. Gland of boll punctured — 26. Rot.
27. Small square as punctured. — 28. Puncture. — 29. Bud cut open, showing rot inside, owing to sting.



Cotton. Rusted bolls.

Plate 21.

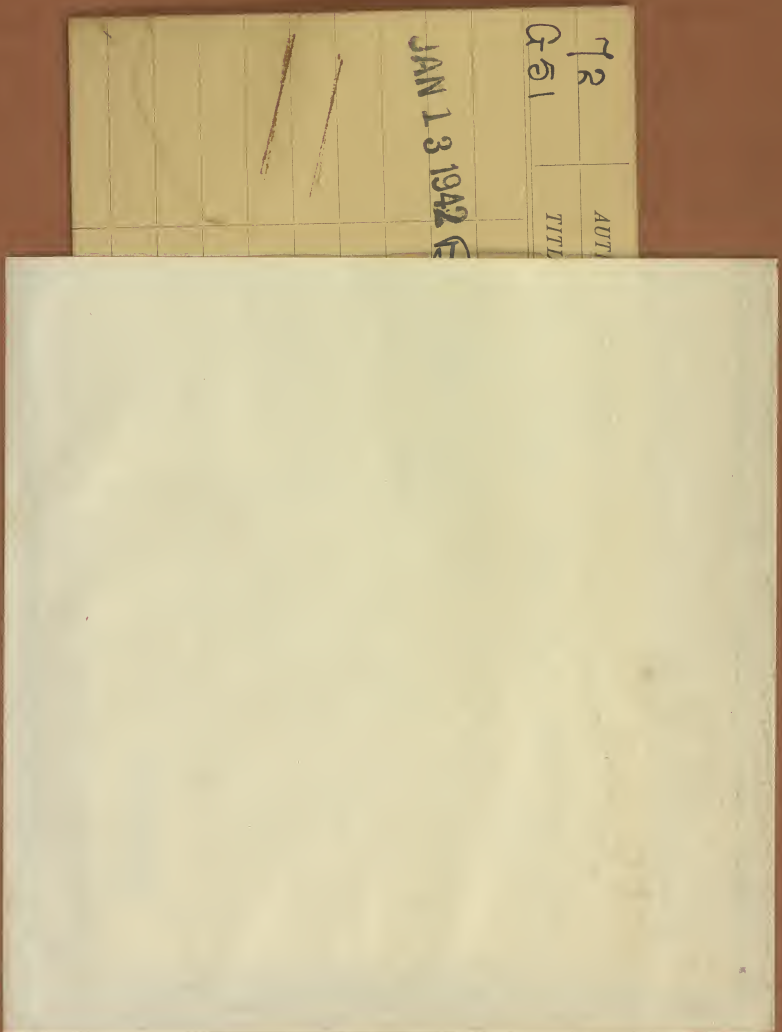
1. Young boll rusted. — 2. Old boll showing a red fungoid growth, by some planters called the red rust. — 3. The same boll at a more advanced stage of the disease, & by many distinguished from no 2. as the Black boll rust. * The caterpillar & figured is frequently found in rusted & rotted bolls, & is also common in mares (as in the figure), in all the stages of its existence it resembles *Linia granella* of Europe. Although these insects are almost invariably found in rotted bolls yet they may be considered merely as the effect & not the cause of the disease, which probably is of fungoid origin. They are also found common in South Carolina, in Maine, which has been previously injured by the *Heliothis armiger*, the Boll or borer worm, or the weather.

J. Glover





Cotton. Healthy, & partially rusted boll. Plate 22.
 1. Healthy boll opening & showing cotton
 2. " " with only one division showing rust. as at no 3.



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